DOCUMENT RESUME

ED 250 462 CE 039 886

AUTHOR Long, James P.; Neuman, Delia
TITLE Adaptation of the Resource Room Version of the Career Planning System for Use with Microcomputers. Final Report.
INSTITUTION Ohio State Univ., Columbus. National Center for Research in Vocational Education.
SPONS AGENCY Department of Education, Washington, DC.
PUB DATE Mar 83
GRANT G008102289
NOTE 44p.; For a related document, see CE 039 885.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Career Education; *Career Planning; Computer Assisted Instruction; *Courseware; *Curriculum Development; Delivery Systems; *Disabilities; Individualized Instruction; Instructional Materials; Junior High Schools; Material Development; Microcomputers; Pilot Projects; Program Development; Program Effectiveness; Program Implementation; *Resource Room Programs; Special Education
IDENTIFIERS *Career Planning System; Special Needs Students

ABSTRACT

An 18-month project was conducted to adapt the resource room version of the National Center for Research in Vocational Education's Career Planning System (CPS) for delivery through microcomputers. Specific goals of the project were as follows: to adapt a print-based product previously found successful with middle school students who displayed mild forms of one of several disabilities, to evaluate the use of that adapted version with a representative sample of such students at sites across the country, to revise the materials on the basis of the evaluation results, and to initiate a plan for the national dissemination of the final revised version of the materials. After selecting the Atari 800 microcomputer system with 64K of random access memory as the delivery system for the revised version of CPS, project staff converted the instructional elements of the earlier version, along with management and record-keeping functions, into a 30-disk package. Various other printed materials, including instructor's and student's guides, were developed for use with the revised system. Based on the results of a field test of the revised CPS that was conducted at five sites throughout the country, it was concluded that middle school students from a variety of special populations found the system interesting, enjoyable, and usable. Students in the aggregated experimental group gained more knowledge concerning career planning than did students in the aggregated control group. Recommendations called for wide dissemination of the revised CPS among different populations at a wide range of grade levels. (MN)

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ED250462

# ADAPTATION OF THE RESOURCE ROOM VERSION OF THE CAREER PLANNING SYSTEM FOR USE WITH MICROCOMPUTERS

Final Report

by

James P. Long

and

Delia Neuman

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

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The National Center for Research
in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

March 1983

CE039886

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- Developing educational programs and products
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- Providing information for national planning and policy
- Installing educational programs and products
- Operating information systems and services
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## FUNDING INFORMATION


PROJECT TITLE: Adaptation of the Resource Room Version of the Career Planning System for Use with Microcomputers

GRANT NUMBER: G008102289

PROJECT NUMBER: 026CH10080

SOURCE OF GRANT: The United States Department of Education

GRANT AUTHORITY: The Education of the Handicapped Act, P.L. 91-230 as amended, CFDA: 84.026C

CONTRACTOR: The National Center for Research in Vocational Education



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# FOREWORD

Career planning for handicapped people has become increasingly important over the last decade because legislation, litigation, and a growing public awareness have all combined to promote the full participation of handicapped citizens in the mainstream of American life. This project, which has resulted in the production of a comprehensive microcomputer-based career planning system for mildly mentally retarded, learning disabled, and severely behaviorally handicapped middle-school students, has thus provided an important and timely tool to assist these students as they begin to explore careers and to make educational decisions that will have significant impact on their adult lives. Moreover, by providing for the delivery of career planning experiences through the latest in microcomputer technology, the project has ensured that its target students will also reap the wide range of learning benefits this technology offers.

Appreciation is expressed to all project staff members who have participated in the eighteen-month effort to design and produce these materials: to Dr. James P. Long and Dr. Leonard O. Nasman, who directed the project; to Delia Neuman, Jon Persavich, and Wheeler Richards, graduate research associates who participated in the project's instructional design phase; to Patrick Hurley, Brent Miller, Devin Needles, Don Kreinbrink, and Dave Keen, who programmed the student materials; to Gail Merecickey, who did the project's graphic design; and to Margaret Barbee, Carolyn Goodrich, and Cathy Martin, who provided secretarial support.

Appreciation is also expressed to the teachers and other staff of the five school districts that participated in the project's field test; their cooperation was essential to ensuring the quality and validity of the final instructional materials.

Robert E. Taylor
Executive Director
The National Center for
Research in Vocational Education

## EXECUTIVE SUMMARY

The National Center for Research in Vocational Education, The Ohio State University, has spent the past eighteen months adapting the resource room version of the National Center's Career Planning System (CPS) for delivery through microcomputers. Working from a print-based product previously found successful with middle-school students who display mild mental retardation, severe behavior handicaps, and learning disabilities, staff have reworked all the elements of that product to take advantage of the motivational, managerial, and interactive capabilities of the Atari 800 microcomputer system.

Whereas the microcomputer version of the CPS retains the framework and basic content of the earlier version, all its instructional elements--Introduction, Interest Sort, forty Activities, forty occupational Briefs, and Education Plan--as well as its management and record-keeping functions have been converted into a thirty-disk software package. In addition, an Instructor Guide and a Student Guide have been written for use in conjunction with the computerized material. Various other printed materials which include an adaptation plan, evaluation instrumentation and evaluation report, an interim report, and this final report, as well as project abstracts and a dissemination brochure, have also been developed.

This report has been prepared in order to provide a comprehensive history of the project, which was entitled Adaptation of the Resource Room Version of the Career Planning System for Use with Microcomputers. The final report describes the project goals, the procedures followed in order to achieve those goals, the results of the evaluation of the adapted materials, and the outcomes of all these efforts. The report is of value not only to the project sponsor and project staff but also to the field sites whose participation was an integral part of the project.

# INTRODUCTION

As stated in the project's proposal, "the basic purpose of the project is to produce a complete software package of the Career Planning System, Resource (Room) Education, for use by selected handicapped persons in an effort to aid them in making the transition from school to work" (p. 21). Recognizing that mildly mentally retarded, behaviorally handicapped, and learning-disabled students need effective career-planning skills in order to participate fully in the occupational mainstream of American society, the project addressed this basic purpose through the achievement of four major project goals, which are as follows:

- To adapt a print-based product previously found successful with middle-school students in the three learning-handicapped groups described above
- To evaluate the use of that adapted version with a representative sample of such students at sites across the country
- To revise the materials on the basis of the evaluation results
- To initiate a plan for the national dissemination of the final revised version of the materials

These goals guided the planning and implementation of the project as described in the following sections of this report.

## PROJECT PROCEDURES

The eighteen months of the project saw a variety of procedures undertaken to plan, implement, and conclude its scope of work. These procedures involved (1) the selection of the microcomputer hardware delivery system, (2) the development of plans to guide both the adaptation of the materials, (3) the strategy for their evaluation, (4) the adaptation itself, (5) the initiation and conduct of the field test, (6) the data analysis, (7) the revision of the product based on that analysis, (8) preliminary dissemination efforts, and (9) the preparation of the final project documentation. Each of these segments of project activity is described in detail in the following sections.

### Selection of the Hardware

After careful consideration of the available hardware options, the Atari 800 microcomputer system (console, television set, and two disk drives) with 64K of random access memory (RAM) was chosen as the delivery system for the Career Planning System, Microcomputer Version. In particular, the Atari's ability to provide excellent color graphics and sophisticated sound synthesis at a reasonable cost made this system especially attractive for the purposes of the project. The Atari's graphics capabilities, for example, enabled project staff to build into the courseware a variety of instructional design techniques to enhance students' motivation and learning. These include (1) a

variety of displays with different sizes and placements of letters to indicate titles, major and minor headings, objectives, standard lists and forms, and other organizational elements found throughout the package; (2) color coding to relate all the components within each individual segment of the package; (3) "player-missile" graphics to provide animation and to allow students to use joysticks to complete various activities; (4) a wide range of color options to allow the design of attractive, realistic illustrations; (5) character-set graphics to enable the rapid loading of illustrations and the efficient use of available memory; and so on. The Atari's sound synthesis capabilities, although less significant here for instructional purposes, enabled staff to compose music to introduce various components of the CPS, to create sound effects to accompany illustrations, and to use fanfares as part of the positive feedback provided to congratulate students for making correct responses.

The Atari's 64K of RAM allowed staff to design a number of sophisticated activities that require substantial memory capabilities. The use of two disk drives allowed staff to develop a comprehensive management system that is one of the most significant features of the CPS, Microcomputer Version. This system, which is described and explained in detail in the CPS Instructor Guide, provides each teacher or counselor with a number of options for creating class records, monitoring each student's progress through the CPS, and altering that progression as necessary to serve student and class needs.

## Development of the Adaptation Plan

The first product prepared as part of the project scope of work, the adaptation plan laid out development procedures and guidelines and specified standards of quality for both the print-based and the computerized project materials. The forty-page document was reviewed for quality and feasibility by a member of the Faculty for Exceptional Children, The Ohio State University. The Plan includes (1) a description of the CPS (components, organization, sequence of student movement, management functions); (2) outlines of the Instructor Guide and Student Guide; (3) listings and descriptions of the 130 separate computer programs to be written for the CPS package; (4) detailed specifications to ensure the instructional and technical quality of the final CPS products; (5) a listing of the computer subroutines to be used throughout the CPS; (6) a catalog of the major display formats to use for the computerized presentation of various kinds of information (e.g., titles, headings, and subheadings, and so forth); and (7) design and programming specifications for the various kinds of displays to be found in the computerized simulation Activities and occupational Briefs. The Plan, which was finalized only after extensive research, discussion, and experimentation, served as the instructional designers' and computer programmers' handbook throughout the development phase of the project.

## Development of the Evaluation Plan

Just as the adaptation plan was developed to guide the creation of the project's instructional materials, the evaluation plan was written to guide the project's conduct of its field test and data analysis phases. This Plan includes an overview of the CPS adaptation project, a description of the overall evaluation design for the project, discussions of both the formative and summative aspects of that design, descriptions of the instrumentation and data analysis techniques to be used in relation to each kind of evaluation, and copies of the pretest and posttest to be administered to the experimental and control groups.

## Adaptation of the Materials

The heart of the CPS adaptation project, this phase was also the most extensive and complex. From January through August of 1982, a team of instructional designers and computer programmers worked together to adapt each of the individual components of the Career Planning System, Resource Room Version, to take full advantage of the managerial and instructional capabilities of the Atari 800 microcomputer system. Project staff also developed a selection of printed materials (Instructor Guide and Student Guide) to support the computerized materials.

In order to understand the adaptation phase fully, it is necessary to have a general awareness of the organization of the CPS and of its instructional components. This information,

which is presented fully in the Instructor Guide, is summarized briefly in the following text and in the accompanying figures.

The Career Planning System, Microcomputer Version, includes three kinds of materials: (1) thirty floppy disks that provide a comprehensive, interactive instructional component that is the main vehicle for student progress through the CPS, as well as an extensive management system for use by the teacher or counselor directing the students' experiences; (2) a Student Guide for each student that provides reinforcement for student learning, a permanent record of the student's experiences with the CPS, and a means for the expansion and discussion of these materials; and (3) an Instructor Guide that provides the theoretical, technical, and instructional information a teacher or counselor needs to implement the CPS.

The core of the CPS, Microcomputer Version, is found in the twenty-seven disks that comprise the System's individualized instructional materials. As illustrated in figure 1, these materials take each student--with teacher facilitation at specified points--from initial Introduction and Interest Sort activities through as many as ten Interest Areas identified on the basis of the student's responses to the fifty items included in the Interest Sort. As figure 1 also shows, students complete their CPS experience by making individual Education Plans in order to synthesize the career knowledge and self-awareness gained through exploring occupations in the Interest Areas and to plan specific activities for the continued investigation of favored occupations.

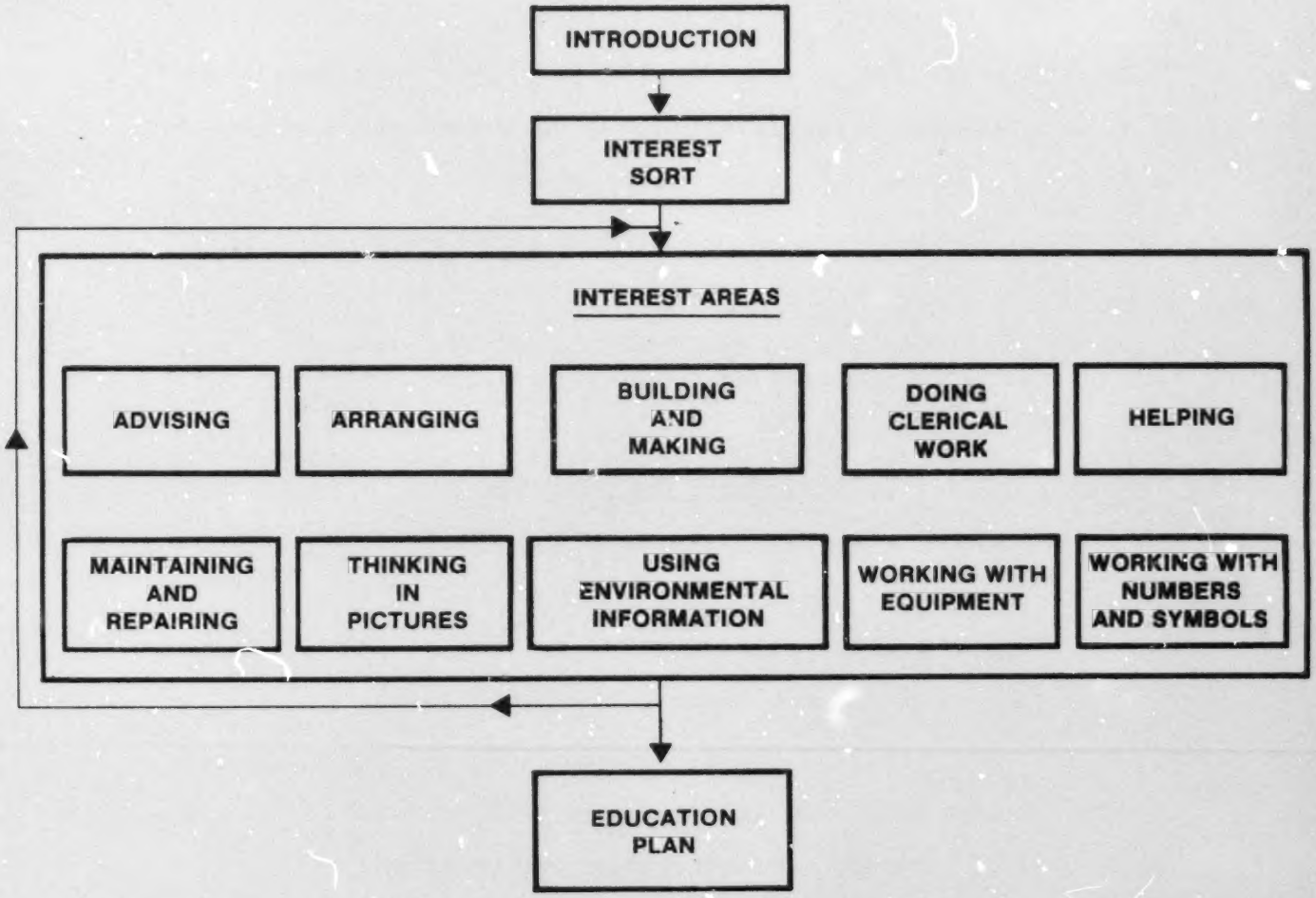


Figure 1. Career Planning System Overview

Figure 2 shows the ten CPS Interest Areas and the four representative occupations included in each. These highlight interests that middle-school students may currently have or wish to explore, rather than focus on traditional occupational clustering systems. The CPS Interest Areas are designed to help students acquire immediate self-knowledge, as opposed to encouraging them to speculate about the future. The occupations included within the Interest Areas were chosen (1) to represent rather than completely cover the world of work; (2) to cover a range of job tasks requiring visual, verbal, and computational skills; and (3) to cover an educational continuum from high school diploma to graduate degree and a range of skills from entry-level to professional.

Figure 3 displays the sequence of student movement through each Interest Area. First, the students encounter a Probe--a brief introduction to various aspects of the Interest Area--and meet four representative workers from the Area whose jobs the students can explore. The students can choose either to leave the Interest Area at this point or to complete one of four interactive Activities designed to simulate the job tasks of these workers and to give students a "feel" for the actual procedures of the jobs. If this Activity excites students' interests in the occupation, they can decide to proceed to occupational Briefs through which the students "interview" the workers by asking questions about information that is important to consider

**1. Advising**

- Child care attendant
- Employment counselor
- Lawyer
- Travel agent

**2. Arranging**

- Architect
- Florist
- Hair stylist
- Interior designer

**3. Building and Making**

- Carpenter
- Drafter
- Painter
- Roofer

**4. Doing Clerical Work**

- Cashier
- File clerk
- Secretary
- Stock clerk

**5. Helping**

- Licensed practical nurse
- Police officer
- Properties manager
- Waiter

**6. Maintaining and Repairing**

- Appliance repairer
- Mechanic
- Plumber
- Sanitation worker

**7. Thinking in Pictures**

- Cartoonist
- Commercial artist
- Display artist
- Photographer

**8. Using Environmental Information**

- Farmer
- Fish and game warden
- Landscape gardener
- Meteorologist

**9. Working with Equipment**

- Computer service technician
- Cook
- Machinist
- Telephone operator

**10. Working with Numbers and Symbols**

- Library assistant
- Market research coder
- Medical laboratory assistant
- Teller

Figure 2. CPS Interest Areas and Occupations

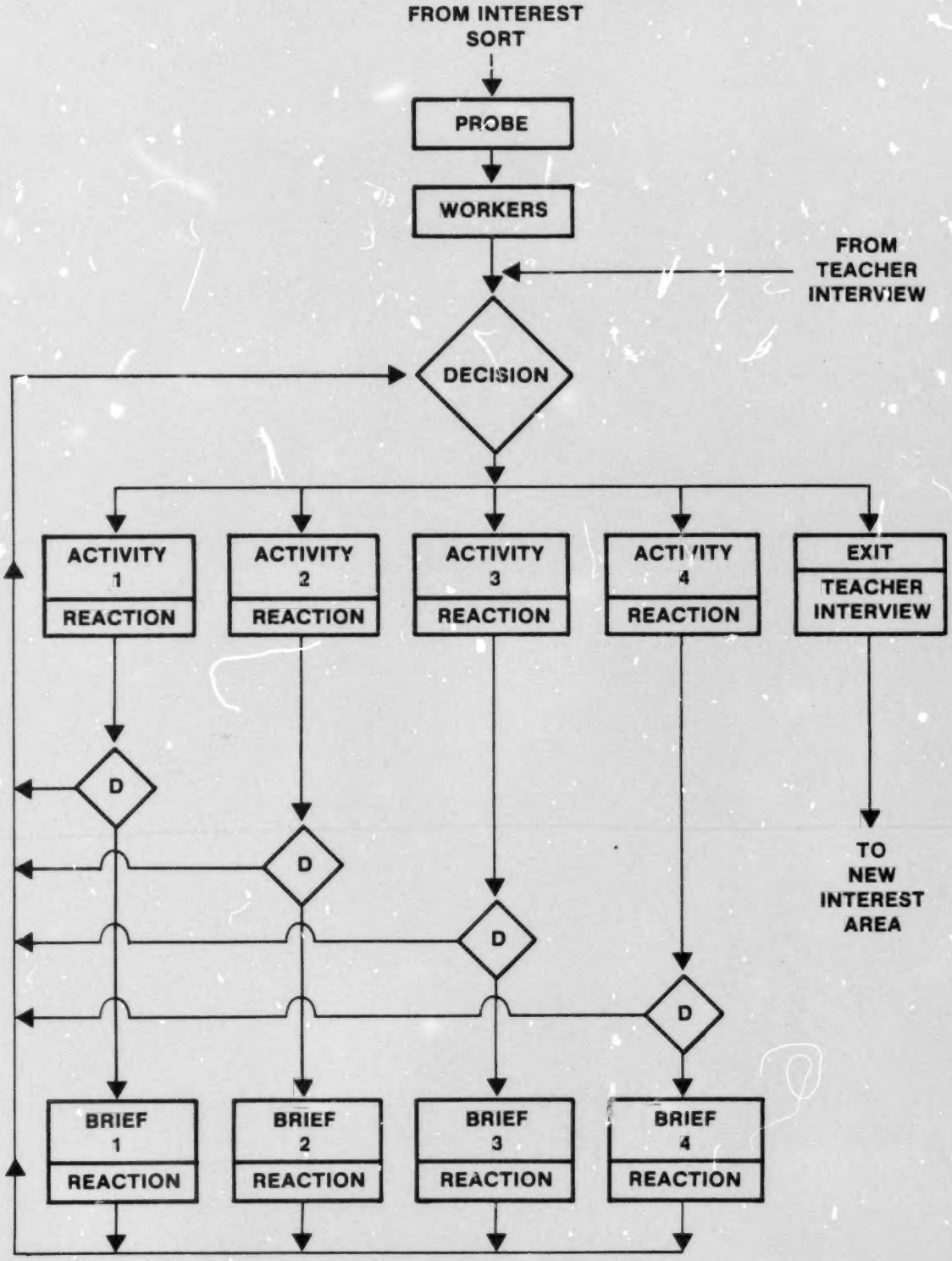


Figure 3. Interest Area Flowchart

when making career decisions (e.g., about additional job tasks, work environment, educational preparation, salary range, and so forth). After exploring as many Activities and Briefs in the Interest Area as the students desire--and, in the process, completing simple Reaction Forms describing their feelings about each--the students talk briefly with the instructor before moving to the next Interest Area on their lists. This brief discussion, termed an Exit Interview, occurs at the conclusion of an Interest Area.

This general overview of the CPS organization and materials describes the resource room version of the Career Planning System as well as the microcomputer version based upon it. Adapting the System from one medium to another, however, involved far more than the one-to-one translation that the broad similarities of the two versions may imply. Rather, the adaptation demanded extensive changes; in fact, it required the redevelopment of many aspects of the System in order to make the microcomputer version valuable in its own right rather than a mere "electronic page turner" indistinguishable from its source except for the fact that the pages appear on a computer screen.

As the adaptation effort began, project staff responsible for the instructional design of the adapted materials reviewed each component of the print-based source material--the Student Guide, Interest Sort, ten Probes, forty Activities, and forty Briefs--to determine the most effective reconfiguration of these

pieces for delivery through the microcomputer. The resulting general design called for the computerization of the Interest Sort, the Probes, the Activities, the Briefs, and most of the original Student Guide (i.e., the Introduction, most of the vocabulary exercises, most of the student record-keeping forms, and part of the Education Plan). The design included reworking the rest of the Guide (i.e., some of the vocabulary exercises and record-keeping forms and most of the Education Plan) and adding to it a variety of new materials to support and reinforce the CPS's core, computerized component. The general design also called for the adaptation and redevelopment of the Instructor Guide to provide a vehicle for integrating all the various aspects of the CPS, Microcomputer Version, into a coherent, easily implemented, and thoroughly documented instructional package.

Once the general design was established, project staff began to prepare individual components of the CPS for programming. This preparation involved (1) reviewing each piece to determine what was necessary to make it suitable as a computer-based educational activity and (2) redesigning each piece as necessary to make it interactive according to the technical and instructional specifications delineated in the adaptation plan. It was during this phase of the project that the display formats and display specifications described earlier in this report were suggested, tried, revised, and finalized.

In addition to creating materials to conform with these specifications, project staff engaged in parallel efforts, as well. These involved not only updating information and verifying accuracy in relation to specific Activities and Briefs, but also redeveloping materials as necessary to take full advantage of the capabilities of the Atari 300 system. This proved to be the most challenging aspect of the adaptation effort, and table 1 illustrates the kinds of alterations in Activities that were made.

The Briefs for the CPS occupations were altered significantly as well. Whereas in the original Briefs students read interviews with imaginary workers in linear fashion, in the computerized Briefs students select from a menu the questions they wish to ask these workers. The menu allowed the students to choose any four out of six questions, in any order.

With the adaptation of the Activities and Briefs well underway, staff began preparing the other components of the CPS for programming. In preparing these pieces (i.e., the Introduction, Interest Sort, and Education Plan), as in preparing the Activities and Briefs, staff specified the content and kind of display format for each display and suggested the graphics to use in each program.

After a component was prepared, one of the project's computer programmers began to program it. The relationship between instructional designers and programmer staff immediately became interactive, since the programmers were often able to suggest

TABLE 1

EXAMPLES OF ORIGINAL AND ADAPTED CPS ACTIVITIES

| OCCUPATION | ORIGINAL ACTIVITY | ADAPTED ACTIVITY |
|---|---|---|
| Lawyer | Student reads about traffic accident and compiles report. | Student witnesses accident, reads basic information about it, writes report, and decides whether to sue on behalf of client. |
| Interior designer | Student cuts and pastes furniture shapes into outlines of rooms. | Student uses keyboard to place pieces of furniture in outlines of rooms. |
| Secretary | Student writes and types letter for employer. | Student schedules employer's appointments for one day. |
| Landscape gardener | Student circles problems (e.g., dead tree, broken wall, etc.) on picture of park. | Student uses joystick to move "player-missile" graphics character to identify problems in park. |
| Licensed practical nurse | Student takes other student's pulse using a watch. | Student takes own pulse using digital timer built into computer display. |

ways to make the materials more attractive, more interesting, and more thoroughly capable of taking advantage of the microcomputer.

The computer-programming staff were also responsible for designing the CPS management system. This comprehensive record-keeping system allows teachers to create and update a class roster, to obtain information about each student's progress through the CPS, to copy student master and data disks, and to interrupt the normal flow of the CPS to allow individual students the flexibility to return to Interest Areas previously explored. Figure 4 displays all the functions included in the CPS management system, each of which is described in detail in the Instructor Guide.

Development of the Instructor Guide and the Student Guide began when the adaptation of the computerized material reached the stage at which the implementation details of the CPS, Microcomputer Version, could be fully understood by project staff and could therefore be clearly communicated to others. The Student Guide, the first of these two pieces to be developed, is an eighty-eight page booklet that provides students with their only hard-copy record of the CPS experience. Designed to serve a variety of purposes throughout that experience, the Student Guide (1) introduces students to the CPS and to the procedures for loading a disk; (2) provides work sheets for practice and reinforcement for the concepts and vocabulary presented in the

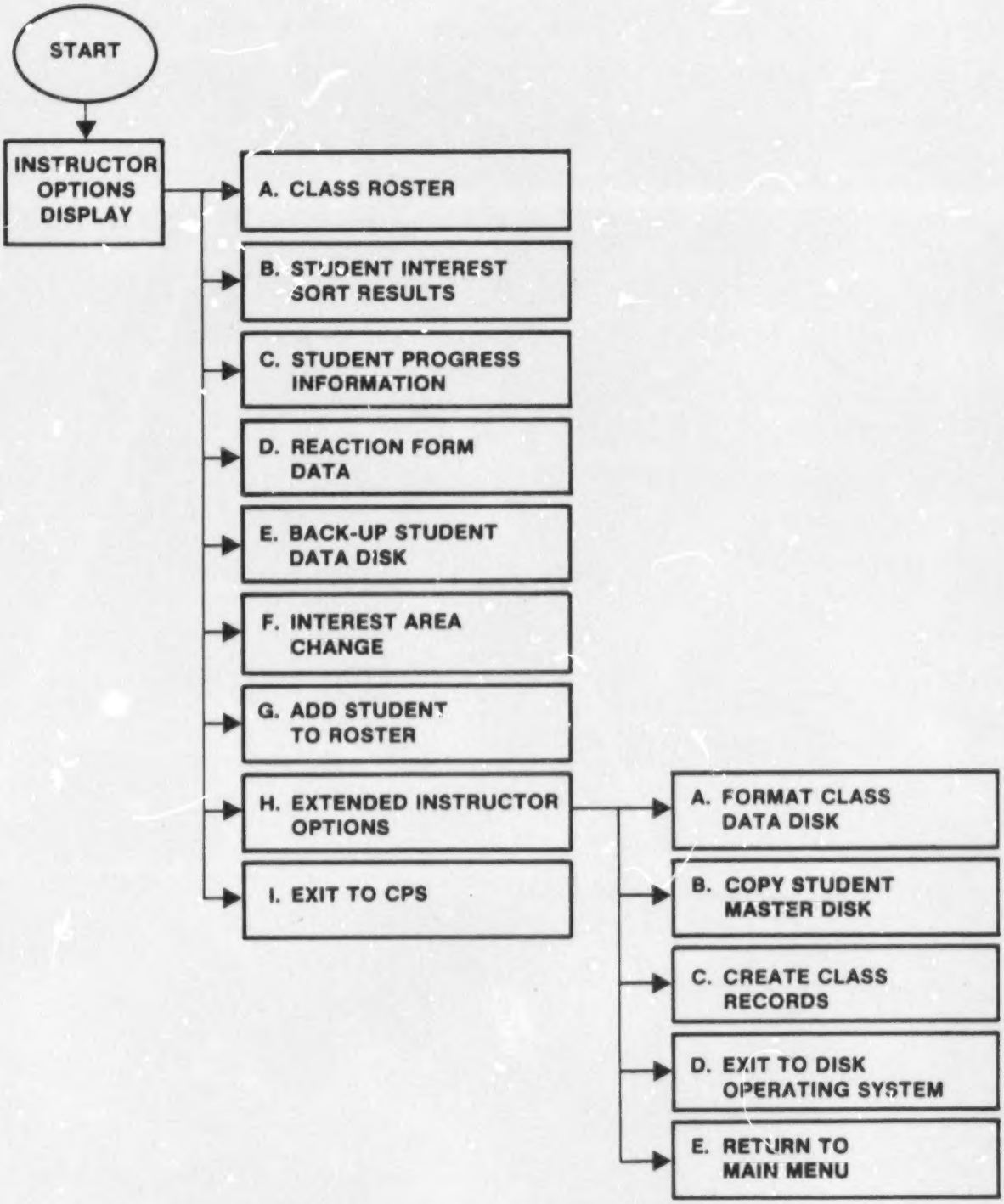
START
INSTRUCTOR OPTIONS DISPLAY
A. CLASS ROSTER
B. STUDENT INTEREST SORT RESULTS
C. STUDENT PROGRESS INFORMATION
D. REACTION FORM DATA
E. BACK-UP STUDENT DATA DISK
F. INTEREST AREA CHANGE
G. ADD STUDENT TO ROSTER
H. EXTENDED INSTRUCTOR OPTIONS
I. EXIT TO CPS
A. FORMAT CLASS DATA DISK
B. COPY STUDENT MASTER DISK
C. CREATE CLASS RECORDS
D. EXIT TO DISK OPERATING SYSTEM
E. RETURN TO MAIN MENU

Figure 4. Instructor Options

computerized Introduction; (3) includes a glossary of terms (e.g., wage, salary, college, apprenticeship) used in the Briefs; (4) provides a permanent record of the students' Interest Sort results; (5) includes a supply of Reaction Forms on which students can expand their answers to the summary questions on the computerized Reaction Forms, as well as a supply of Career Plan Pages on which students can copy the courses to take, activities to pursue, and so forth, that are presented in the computerized Briefs; (6) provides a permanent record of all the jobs (to a maximum of ten) in which the students' computerized Reaction Forms indicate a high degree of interest; and (7) concludes with a section of Education Plan pages, each comprised of eight questions designed to guide the instructor/student planning process that is the culmination of the students' Career Planning System experiences.

The final document prepared as part of the materials adaptation phase of the project is the Instructor Guide, a sixty-page manual that explains what the CPS is and how to use it. Table 2 illustrates the contents and sequence of the Instructor Guide.

Designed to provide all the information a teacher or counselor needs to implement the CPS, the Instructor Guide provides (1) a basic awareness of the goals, purposes, conceptual bases, and developmental history of the CPS, Microcomputer Version; (2) a description of the content, organization, and sequence of student activities of the CPS; (3) a detailed

TABLE 2

CONTENTS OF INSTRUCTOR GUIDE

Introducing the CPS

- What the CPS is
- Why handicapped students should use the CPS
- What advantages the microcomputer version offers
- Materials
- Organization

Using the CPS

- Technical procedures
- Instructional procedures

Supplementing the CPS

- Additional activities
- More information

explanation of the procedures for using the management component of the CPS and for guiding students through the instructional component; (4) suggestions for group activities to supplement and expand upon the individualized core activities of the CPS; and (5) sources of additional information about careers for instructors and students who wish to pursue various topics in more detail. The Instructor Guide is thus the vehicle that integrates all the aspects of the Career Planning System, Microcomputer Version, into a coherent, easily implemented, and thoroughly documented instructional package.

A field test edition of the Instructor Guide also served in project evaluation efforts. A section of this edition (entitled "Evaluating the CPS") included two of the evaluation instruments--Exit Interview Forms and an Instructor Log--and instructions for completing the pretests and posttests that provided the primary summative data for the project.

## Initiation and Conduct of the Field Test

Preparations for the field test of the Career Planning System, Microcomputer Version, began early in the project, when contacts were made with a number of school districts across the country in an effort to identify five suitable field test sites. Negotiations with the following districts resulted in the placement of the materials in schools within or adjacent to major population centers distributed throughout the United States, as follows:

- Boulder Valley Public Schools
  Boulder (Denver), Colorado
- Brentwood Public Schools
  Brentwood (St. Louis), Missouri
- Columbus Public Schools
  Columbus, Ohio
- Farmers Branch--Carrollton I.S.D.
  Carrollton (Dallas), Texas
- Freeport Public Schools
  Freeport (New York City), New York

The field test itself was formally initiated with a full-day user training workshop conducted by project staff at the

National Center on August 18, 1982. One or more representatives from each of the participating school districts attended this workshop to learn about the CPS, as well as about how to use it with their students and to collect the requisite data during the testing phase. Figure 5 displays the specific activities accomplished during the training session.

Complete sets of hardware, software, and printed materials were shipped to the sites during the first week of September 1982 so that the field test could begin as early in the fall term as possible. After administering the pretests, field test teachers guided their students' use of the materials until the first week in December, when they administered the posttests and returned all the appropriate materials to the National Center for analysis.

The implementation of the field test at each site reflected the specific characteristics of the students, setting, and staffing at the site. In Boulder, for example, the student participants displayed the full spectrum of handicapping conditions--learning disabilities, mild mental retardation, and behavioral handicaps--for which the materials were designed. The hardware was housed in a special glassed-in area within a media center and the principal implementor was a retired teacher employed as a consultant specifically for this task. Students were excused from their regular classes to work with the CPS materials, and each spent approximately ten hours on this project over the course of the field test.

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AGENDA
TRAINING SESSION
CAREER PLANNING SYSTEM
MICROCOMPUTER ADAPTATION PROJECT
AUGUST 18, 1982

| | | |
|---|---|---|
| I. | INTRODUCTIONS | Jim Long |
| II. | OVERVIEW OF CPS PROJECT | Len Nasman |
| III. | SOFTWARE ORGANIZATION | Len Nasman |
| | A. Introduction | |
| | B. Interest Sort | |
| | C. Interest Areas | |
| | D. Education Plan | |
| | E. Instructor Options | |
| IV. | ACTIVITY DEMONSTRATIONS | (Hands-on) |
| V. | STUDENT DISK PREPARATION | Pat Hurley |
| VI. | INSTRUCTOR GUIDE/STUDENT GUIDE | Delia Neuman |
| VII. | PILOT TEST DATA AND RECORD-KEEPING | Jim Long |
| VIII. | SYSTEM TRY-OUT | (Hands-on) |
| IX. | HARDWARE SET-UP | Len Nasman |
| X. | WRAP-UP | Jim Long |

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Figure 5. Agenda of CPS Training Session

In Brentwood, students with learning disabilities and behavioral handicaps worked on the CPS materials in a self-contained classroom under the direction of a teacher of remedial reading and math. While individual students worked on the computer at the back of the room, four or five other students worked at tables on their regular remedial assignments. Treatment-group students spent approximately four hours a week using the CPS materials.

All the participants in Carrollton were learning disabled students who were excused from their special education, elective, and academic classes to work on the CPS materials in a separate room under the direction of an educational diagnostician. The amounts of time individual students spent working with the materials varied according to the students' abilities and to the class periods during which students were scheduled, with each student spending an average of approximately ten hours with the materials during the field test period.

The testing in Columbus was conducted at a school for severely behaviorally handicapped students under the direction of the school's work-study coordinator. Students were called individually to a separate room and allowed to work on the materials until it was time to return to their regular classes. The materials were in use for two and a half days a week, with each student working from forty to sixty minutes or more each week.

Participants in Freeport were severely behaviorally handicapped and learning disabled students, each of whom worked on the CPS materials in a self-contained classroom for approximately thirty-five minutes once a week. Each student was excused from regular classes to work individually with one of two special education teachers.

## Analysis of the Data

Both summative and formative data were collected through the field test phase of the project and were subsequently analyzed to determine the effectiveness of the CPS, Microcomputer Version, as well as to guide the revision process by identifying the particular strengths and weaknesses of the instructional package.

As described extensively in the evaluation report, summative data were collected primarily through a pretest-posttest design involving an experimental group of forty-nine learning-handicapped middle-school students and a comparable (control) group of twenty-three students. Teachers' rankings of the materials were collected through an "Instructor Log" and were used to obtain summative measures of the teachers' perceptions of the quality and utility of the materials. The Wilcoxon Matched-Pairs Sign Test was used in order to analyze the pretest-posttest data, and means of the teachers' rankings on the Instructor Log were computer in order to obtain an understanding of the teachers' perceptions.

The results of the analysis of both types of summative data are provided in detail in the evaluation report. Conclusions and recommendations based on the analysis are presented briefly in a subsequent section of this final report.

The evaluation report also describes in detail the collection of formative data through a variety of strategies (i.e., use of an Instructor Log, an Exit Interview Form with experimental-group students, biweekly telephone calls from project staff to each site, and several site visits) as well as the analysis of this data to identify both the strengths of the CPS package and those aspects of it in need of revision. Working through seven Instructor Logs, 182 Exit Interview Forms, and extensive notes from the more informal telephone and personal conversations, project staff uncovered patterns of teacher and student responses indicating both that the students were motivated and enriched by their work with the Career Planning System, Microcomputer Version, and that the materials could be made even more effective for learning-handicapped students. Field test teachers and students offered specific recommendations for improvement and suggested such improvements through the patterns of their responses as well. These data were used to guide the revision effort and to improve the overall quality of the CPS, Microcomputer Version, package.

## Revision of the Materials

This phase of the project involved the incorporation into the CPS package of two kinds of improvements: those recommended

by the field test participants and those recognized as beneficial by project staff. Guided by the data obtained from the field, project staff reworked various components of the CPS materials to make them less wordy and more readable, and less complex and more direct. A good deal of the computation required in various Activities was eliminated, and what remained was made simpler by recasting it in smaller steps with more explicit directions. In addition, questions that were sometimes included to test students' awareness of the occupation-related content inherent in some Activities were eliminated, and the Activities were reworked as necessary to enable the students to complete them successfully without having to master significant amounts of technical content.

## Preliminary Efforts at Dissemination

In keeping with the stipulation of the sponsor that the National Center initiate plans for the national dissemination of the Career Planning System, Microcomputer Version, project and field staff engaged in a variety of tasks designed to set the stage for a full-scale dissemination effort. These tasks included project staff's preparing project abstracts and a project brochure, presenting the project and its results at various meetings, and contacting agencies and organizations likely to be interested in marketing and distributing the final CPS instructional package. Field site staff members were involved in dissemination efforts through presenting both formal and informal demonstrations for local teachers and administrators interested in the CPS materials.

Early in the project, an abstract describing the purposes, anticipated procedures, and expected outcomes of the effort was prepared to publicize the project. Copies of this abstract were sent out in response to specific requests for information and were distributed to persons the project staff thought would be interested in the project. Toward the end of the project, a revised and updated version of this abstract was prepared in order to enable the National Center to respond more appropriately to an increasing number of requests for information. Distribution of this abstract continues to be handled by the National Center's Program Information Office (PIO), an internal support function designed to provide maximum visibility for National Center projects, services, and publications.

The PIO also distributes a brochure about the Career Planning System, Microcomputer Version, designed to describe this product to potential purchasers. Written and designed by project staff, the brochure is an eight-panel folded marketing piece that highlights the nature, content, purposes, implementation procedures, and availability of the revised CPS instructional package.

Throughout the duration of the scope of work, project staff took advantage of a number of opportunities to publicize the project at various professional meetings. Early in the project, staff described the plans for the effort at the first annual Educational Computer Fair sponsored by the Educational Computer Consortium of Ohio. Invited to the second annual fair to provide

updated information on the project, staff returned to Cleveland in October 1982 to give another presentation.

Staff also presented a description of the project at the Hodson-Beneficial Colloquium on Future Perspective and Realities: Career Development for Exceptional People. Sponsored by the Johns Hopkins University, this event was held in Baltimore, Maryland in May 1982.

Finally, project staff presented "Career Planning Meets the Micro: A Demonstration" at the Council for Exceptional Children's National Topical Conference on the Use of Microcomputers in Special Education in Hartford, Connecticut in March 1983. Staff also submitted a copy of that presentation for inclusion in ERIC's Clearinghouse on Handicapped and Gifted Children. Working under the sponsorship of the National Center (rather than under the grant that funded this project), staff will make that same presentation at the Council for Exceptional Children's Sixty-First Annual International Convention in Detroit in April 1983.

During the final six months of the project, project staff investigated a number of possibilities for the eventual commercial marketing and distribution of the CPS materials. Possibilities include distributing these materials through the National Center's own cost-recovery operation; through the services of LINC Resources, Inc. (a function of the Market Linkage Project for Special Education sponsored by the U. S. Department of Education); and through the Atari Corporation. At present, plans

for dissemination are being finalized with the Atari Corporation, which has indicated verbally to project staff that one or more of three possible avenues for marketing and distribution by Atari are near-certainties.

Plans are for the National Center to submit copies of the project deliverables to Atari, after having recieved sponsor approval of the deliverables and sponsor approval to so submit them. It is expected that, after having examined the products, Atari will suggest that the National Center enter into an agreement for marketing and distribution rights.

The CPS, Microcomputer Version, has been protected by copyright since the start of the field test in order to make the product more attractive to such commercial marketing and distribution companies as Atari.

It is expected that after the conclusion of the project, the CPS, Microcomputer Version, will be submitted by the National Center for approval of the federal Joint Dissemination Review Panel (JDRP). Such approval, if obtained, will make the product even more attractive to commercial marketing and distribution companies.

Field site staff have played an important role in getting product dissemination efforts under way. Each site agreed at the outset of the field test to serve as a regional demonstration center for the CPS materials, and in that context each has publicized them in various ways. For example, Boulder, Colorado,

staff demonstrated the materials for a number of audiences including the district's special education teachers, participants in a state career education conference, and a number of small groups of teachers and other staff. Columbus, Ohio, staff members hosted a workshop at which local administrators and work-study coordinators were introduced to the CPS materials, and have also demonstrated them to a number of other district teaching and administrative personnel. Brentwood, Missouri, staff invited all district personnel working in special education and/or in guidance to an organized open house to view the system. In Freeport, New York, field staff invited fifty-six nearby school districts to attend an afternoon session in career awareness for special education students that featured the CPS, Microcomputer Version. At this session an oral presentation was made by a twelve-year-old special education student to the visiting teachers and counselors. Similarly, the Carrollton, Texas, field staff devised a way for all special education personnel in the district and in surrounding districts to view the system in operation. Thus, all five pilot-test sites have assisted in the dissemination effort, as agreed.

## Documentation of Project Efforts

Documentation of the progress of the project has been accomplished through the submission of two formal documents, one an interim report and the other this final report. The interim report, which was submitted on December 1, 1982, included a cover letter describing all major accomplishments, concerns, and

modifications over the first year of the project as well as copies of all the printed products that project staff had developed by that point--the adaptation plan, the Student Guide, and the Instructor Guide. This final report provides a detailed history and description of every aspect of the project and presents a comprehensive discussion of its purposes, procedures, evaluation findings, and final results.

## EVALUATION RESULTS

As described in detail in the CPS evaluation report and briefly in the "Project Procedures" section of this report, the Career Planning System, Microcomputer Version, materials were field tested in five sites across the country in order to collect both formative and summative data on the quality and utility of the materials. Project staff analyzed both kinds of data in order to determine the overall effectiveness of the materials in their unrevised state and to identify improvements that could enhance the quality of the revised version. The results of those analyses, which are discussed extensively in the evaluation report, are summarized next.

### Conclusions

The main conclusions are as follows:

- Middle-school students from a variety of special populations (mildly mentally retarded, learning disabled, and behaviorally handicapped) found the system interesting, enjoyable, and usable.
- Teachers of such students found the system beneficial for teaching career planning and for encouraging and facilitating career guidance interviews.
- Students in the aggregated experimental group gained more knowledge (about careers, about self with respect to careers and career planning, and

about career planning in general) than did students in the aggregated control group. The difference was statistically significant at the .05 level.

- The system is usable for a wider audience than the group with which it was pilot-tested.
- The system's various programs, if made accessible by means of a simple menu device, are valuable even without the management system.

## Recommendations

The main recommendations are as follows:

- The CPS, Microcomputer Version, should be widely disseminated and used among different populations (special education students and others) at a wide range of grade levels.
- An alternative management system for CPS, Microcomputer Version, should eventually be prepared to allow access to any program through a simple menu device, without requiring the user to first pass through the Interest Sort.
- Print-based materials should not be adapted to the microcomputer; the inevitable tendency is to make the microcomputer an electronic page turner.

- The use of a microcomputer with a videodisc player (or similar device) should be investigated to provide better sound and graphics while (possibly) reducing the programming time.
- When possible, systems should not require the simultaneous use of the joystick and the keyboard.
- When possible, hard copy, such as the results of the Interest Sort, should be prepared by a printer attached to the microcomputer, rather than by students or teachers who make handwritten entries in an accompanying manual.
- The research design for evaluating such projects should involve larger pilot-test groups and a greater number of questions for each category of information investigated.
- The length of the pilot-test period for such projects should be one school year, rather than one quarter, in order to enable more students to complete the entire system.

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## PROJECT OUTCOMES

The major outcome of the project is, of course, the complete instructional package entitled the Career Planning System, Microcomputer Version. This as well as the other project outcomes are listed in table 3. The reader is referred to earlier sections of this report for descriptions of each of these principal products of the project.

One outcome of the project that cannot be listed along with the deliverables is the development of the increased ability of project staff to design instructional packages for microcomputer-based education for exceptional students. A new and exciting field, microcomputer-based education offers particular promise for learning-handicapped students, who can profit greatly from the individualization of instruction, the opportunity to act effectively upon the environment, and the possible bypassing or compensating for personal deficits through new and emerging electronic technology. National Center staff who had the opportunity to work on this project have developed knowledge and skill that will enable them to make valuable contributions to the vocational preparation of handicapped students through the principles and techniques of this field.

TABLE 3

SUMMARY OF PROJECT OUTCOMES

| | OUTCOME | DELIVERY DATE |
|---|---|---|
| 1. | Career Planning System, Microcomputer Version, Revised Edition<br>• Thirty floppy disks<br>• Student Guide<br>• Instructor Guide | March 1983 |
| 2. | CPS Adaptation Plan | April 1982 |
| 3. | CPS Evaluation Plan | September 1982 |
| 4. | Interim report | December 1982 |
| 5. | CPS Evaluation Report | February 1983 |
| 6. | Project abstracts | Fall 1982 and Winter 1983 |
| 7. | Product brochure | March 1983 |
| 8. | Final report | March 1983 |